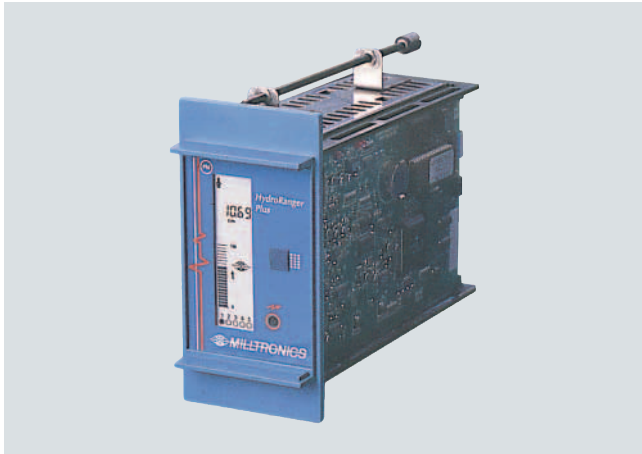


# Level Measurement

## Continuous level measurement - Ultrasonic controllers

HydroRanger Plus

### Overview



HydroRanger Plus is an ultrasonic level controller for control of wet wells and reservoir pump operations, differential control and open channel flow monitoring, using energy-saving algorithms.

### Benefits

- Outputs for alarms, chart recorders, controllers and integration of existing systems
- Monitors wet wells, weirs and flumes
- Energy-saving function with built-in real-time clock
- Special control mode to reduce grease rings and other deposits
- Integral temperature compensation
- Pump performance monitoring
- System monitoring and network analysis

### Application

The system is effective in wet wells, weirs, and flumes where foam and turbulence are typical operating conditions. It can be customized to meet your specific application needs – from measuring flow rate in a narrow flume to volume in a ferric chloride storage bank.

The system consists of the electronics housed in a wall-mounted enclosure and a hermetically sealed, corrosion-resistant Echomax<sup>®</sup> transducer. These components can be separated by up to 365 m (1200 ft).

Optional submergence shields ensure consistent operation in wet wells where the transducer may be submerged during flooding from rainfall or a power outage. Siemens patented detection software can differentiate between a submerged condition and a high level.

- Key Applications: wet wells, weirs, flumes

### Technical specifications

<b>Mode of operation</b>	
Measuring principle	Ultrasonic level measurement
Measuring range	0.3 ... 15 m (1 ... 50 ft)
Measuring points	1 or 2
<b>Output</b>	
Ultrasonic transducer	44 kHz
Relays	5 alarm/control relays, 1 SPDT Form C per relay, rated 5 A at 250 V AC, resistive load
mA output	0/4 ... 20 mA, optically isolated
• Max. load	1 k $\Omega$
• Resolution	0.1 % of 20 mA
<b>Accuracy</b>	
Error in measurement	0.25 % of range or 6 mm (0.24"), whichever is greater
Resolution	0.1 % of measuring range or 2 mm (0.08"), whichever is greater <sup>1)</sup>
Temperature compensation	-50 ... +150 °C (-58 ... +302 °F) <ul style="list-style-type: none"> <li>• Integral temperature sensor</li> <li>• External TS-3 temperature sensor (optional)</li> <li>• Programmable fixed temperature</li> </ul>
<b>Rated operating conditions</b>	
Ambient conditions	
• Ambient temperature for enclosure	-20 ... +50 °C (-4 ... +122 °F)
<b>Design</b>	
Rack mount	DIN 3 HU/14 pitch, 4 rail plug-in unit suitable for standard 84 pitch (19") rack
Panel mount	Suitable for standard panel cutout DIN 43700, 72 x 144 mm, 100 mm center height
Degree of protection (wall mount)	IP65/NEMA 4X/Type 4X
Weight (rack and panel mount)	0.87 kg (1.9 lbs)
Weight (wall mount)	1.5 kg (3.3 lbs)
Material (enclosure)	Polyester/polycarbonate alloy
<b>Electrical connection</b>	
Ultrasonic transducer cable extension	Commercially available copper conductor according to local requirements, rated 250 V/5 A RG 62-A/U coaxial cable with low capacitance
mA output signal	2-core copper conductor, twisted, shielded, 0.5 ... 0.75 mm <sup>2</sup> (22 ... 18 AWG), Belden <sup>®</sup> 8760 or equivalent is acceptable
<b>Power supply</b>	
Ultrasonic transducer	100/115/200/230 V AC, $\pm$ 15 %, 50/60 Hz, 15 VA and/or 9 ... 30 V DC, 8 W
Ultrasonic transducer	Compatible transducers: ST-H and Echomax series XPS-10/10F, XPS 15/15F, XCT-8, XCT-12 and XRS-5
<b>Displays and controls</b>	
Rack and panel mount	75 x 20 mm (3 x 0.8") LCD (selectable backlighting)
Wall mount	100 x 40 mm (4 x 1.5") multifield LCD, backlit
<b>Programming</b>	Removable programmer or optional Dolphin Plus
<b>Memory</b>	EEPROM (non-volatile), no backup battery required
<b>Certificates and approvals</b>	CE <sup>2)</sup> , FM, CSA <sub>US/C</sub> , C-TICK

<sup>1)</sup> The measuring range corresponds to the distance from the zero point to the sensor face, plus any range extension.

<sup>2)</sup> EMC certificate available on request

<sup>®</sup> Belden is a registered trademark of Belden Wire and Cable Company

# Level Measurement

## Continuous level measurement - Ultrasonic controllers

### HydroRanger Plus

Selection and Ordering data	Order No.
<b>HydroRanger Plus, rack and panel mount</b> L) <p>Non-contacting ultrasonic echo ranging technology monitor that comes standard with a backlit display Measuring range: 0.3 m to 15 m (1 ... 50 ft)</p>	<b>7ML1025-</b>
<b>Mounting/device version</b> Version for 19" rack (requires terminal block; see accessories) Version for panel	1 2
<b>Approvals</b> CE (EN 61326), CSA <sub>US/C</sub> , FM, C-TICK	C
<b>Input voltage</b> 100 V AC, 9 ... 30 V DC 115 V AC, 9 ... 30 V DC 200 V AC, 9 ... 30 V DC 230 V AC, 9 ... 30 V DC	A B C D

Selection and Ordering data	Order code
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<b>Further designs</b> Please add <b>"-Z"</b> to Order No. and specify Order code(s).	
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Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y15</b>
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Operating Instructions	Order No.
------------------------	-----------

English	C) <b>7ML1998-1AC02</b>
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French	C) <b>7ML1998-1AC12</b>
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German	C) <b>7ML1998-1AC32</b>
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Note: The Operating Instructions should be ordered as a separate item on the order.  
This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.

Other Operating Instructions	Order No.
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SmartLinx Allen-Bradley Remote I/O, English	C) <b>7ML1998-1AP03</b>
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SmartLinx PROFIBUS DP, English	C) <b>7ML1998-1AQ03</b>
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SmartLinx PROFIBUS DP, German	C) <b>7ML1998-1AQ33</b>
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SmartLinx PROFIBUS DP, French	C) <b>7ML1998-1AQ12</b>
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SmartLinx DeviceNet, English	C) <b>7ML1998-1BH02</b>
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Note: The appropriate SmartLinx Operating Instructions should be ordered as a separate line on the order.

Accessories	Order No.
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Handheld programmer	<b>7ML1830-2AC</b>
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Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure	<b>7ML1930-1AC</b>
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Terminal block for rack mount	<b>7ML1830-1JL</b>
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SITRANS RD100 Remote display - see Chapter 8	
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SITRANS RD200 Remote display - see Chapter 8	
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SITRANS RD500 Remote display - see Chapter 8	
--	--

Spare parts	Order No.
-------------	-----------

Card, Analog HydroRanger Plus Rack/Panel	C) <b>7ML1830-1LR</b>
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Card, daughter	C) <b>7ML1830-1LS</b>
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Card, display, backlit	C) <b>7ML1830-1LX</b>
------------------------	-----------------------

Selection and Ordering data	Order No.
<b>HydroRanger Plus, wall mount</b> L) <p>Non-contacting ultrasonic echo ranging technology monitor that comes standard with a backlit display Measuring range: 0.3 m to 15 m (1 ... 50 ft)</p>	<b>7ML1028-</b>
<b>Input voltage</b> 100 V AC, 9 ... 30 V DC 115 V AC, 9 ... 30 V DC 200 V AC, 9 ... 30 V DC 230 V AC, 9 ... 30 V DC	1 2 3 4
<b>Approvals</b> CE; FM General Purpose; CSA Class I, Div. 2, C-TICK	C
<b>Mounting/enclosure version</b> Standard enclosure (NEMA 4X) Standard enclosure prepared for five M20 cable glands	1 3

Selection and Ordering data	Order code
-----------------------------	------------

C) Subject to export regulations AL: N, ECCN: EAR99	
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L) Subject to export regulations AL: N, ECCN: 3A991X	
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Selection and Ordering data	Order code
-----------------------------	------------

<b>Further designs</b> Please add <b>"-Z"</b> to Order No. and specify Order code(s).	
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Stainless steel tag [69 x 50 mm (2.71 x 1.97")]: Measuring-point number/identification (max. 16 characters) specify in plain text	<b>Y15</b>
--	------------

Operating Instructions	Order No.
------------------------	-----------

English	C) <b>7ML1998-1AC02</b>
---------	-------------------------

French	C) <b>7ML1998-1AC12</b>
--------	-------------------------

German	C) <b>7ML1998-1AC32</b>
--------	-------------------------

Note: The Operating Instructions should be ordered as a separate item on the order.  
This device is shipped with the Siemens Milltronics manual CD containing the complete ATEX Quick Start and Operating Instructions library.

Accessories	Order No.
-------------	-----------

Handheld programmer	<b>7ML1830-2AC</b>
---------------------	--------------------

Tag, stainless steel, 12 x 45 mm (0.47 x 1.77"), one text line, suitable for enclosure	<b>7ML1930-1AC</b>
--	--------------------

M20 cable gland kit (6 M20 cable glands, 6 M20 nuts, 3 stop plugs)	<b>7ML1830-1GM</b>
--	--------------------

SITRANS RD100 Remote display - see Chapter 8	
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SITRANS RD200 Remote display - see Chapter 8	
--	--

SITRANS RD500 Remote display - see Chapter 8	
--	--

Spare parts	Order No.
-------------	-----------

Card, mother main	C) <b>7ML1830-1LV</b>
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Card, daughter	C) <b>7ML1830-1LW</b>
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Card, display	C) <b>7ML1830-1LU</b>
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C) Subject to export regulations AL: N, ECCN: EAR99	
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# Level Measurement

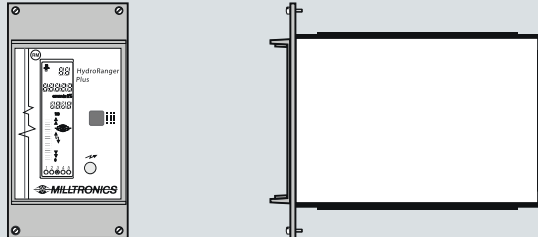
## Continuous level measurement - Ultrasonic controllers

HydroRanger Plus

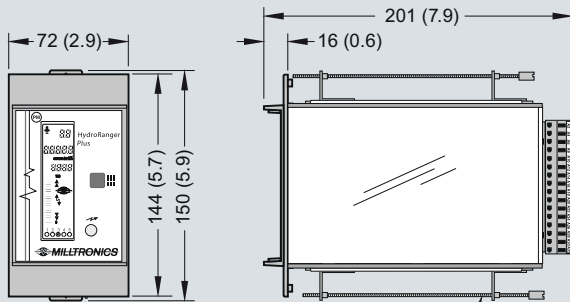
### Dimensional drawings

#### Rack Mount

DIN 3U/14HP, 4 rail plug-in unit suitable for standard 84 HP (19") subrack. (Terminal is customer supplied or available as optional accessory.)

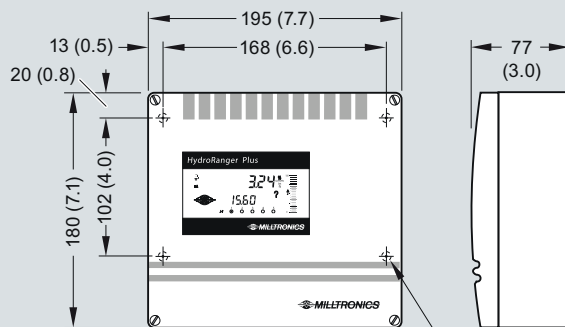


#### Panel Mount



Slip on mounting bracket top and bottom screws to be tightened to no more than 5.9 Nm (1 inch/lb.) torque.

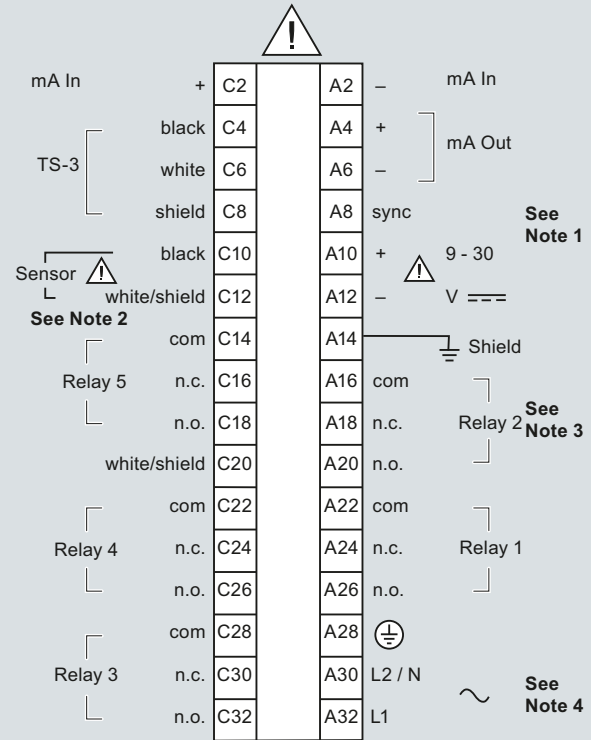
#### Wall Mount



Suitable location for conduit entrances. Use watertight conduit hubs to maintain enclosure rating. mounting holes, Ø4.5 (0.18), 4 places

HydroRanger Plus, dimensions in mm (inch)

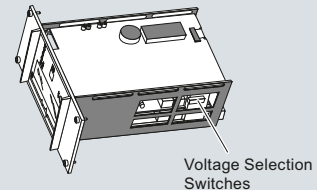
### Schematics



#### Note:

1. Required only if mounted adjacent to other Siemens Milltronics equipment. Interconnect all 'SYNC' terminals with a single 18 AWG (0.5 mm<sup>2</sup>) wire.
2. Use RG-62 A/U coaxial (or equivalent) for extensions up to 365 m (1200 ft). Run in grounded metal conduit, separate from other wiring.
3. Each relay has 1 set of Form 'C' (SPDT) contacts relay rated at 5 A 250 V AC, non-inductive, when equal or lower rated limiting fuses are installed. Relay de-energized when in alarm conditions and energized for pump control.
4. Before applying AC power (mains), ensure the correct voltage is selected. Never operate the HydroRanger Plus with the ground (earth) wire disconnected.

#### Voltage Selection

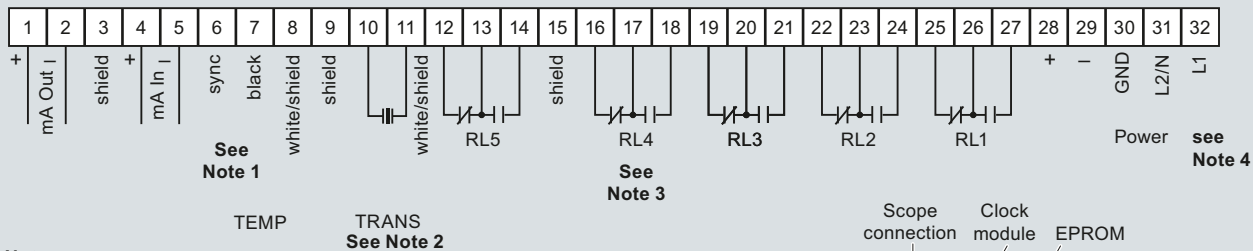


HydroRanger Plus connections, rack and panel mount

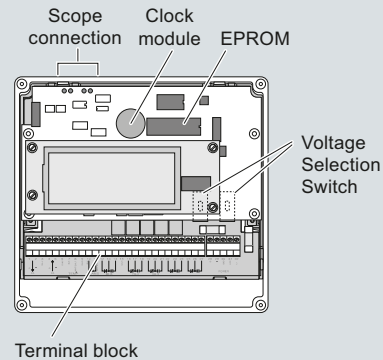
# Level Measurement

## Continuous level measurement - Ultrasonic controllers

### HydroRanger Plus


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5

HydroRanger Plus connections, wall mount

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